March 2016 Vol. 41, No 3

World Reports Covering Climate, Behavior, and Commodities

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BROWNING[™] WORLD CLIMATE BULLETIN

Bye, Bye Blob

NASA has confirmed that the Pacific 'warm

blob' has disappeared. For almost three years,

the water in the Northeast Pacific has had a

huge and mysterious pool of warm water that

has wreaked havoc on marine life from Alaska

to Mexico, and altered weather patterns across

North America, causing droughts and intensi-

fying hurricanes. It now is officially gone and

shape the dry weather that plagued the West.

It was greater than a million square kilometers

(386,000 square miles) in size and 3°C (5.4°F)

hotter than normal - a lot of extra energy al-

tering the air patterns overhead. The warmer

air altered circulation, steering storms into

From a weather point of view, this helped to

will not be coming back any time soon.

A Browning Media Publication

IN THIS ISSUE

- Between the disappearance of the hot "Pacific Blob" and fading of the La Niña, West Coast rainfall has left California, Nevada and parts of Alberta still in drought. Following a dry February, California snowpack is 84% of normal and the reservoirs are 66% of average for this time of year.
- 0 The cold Northern Atlantic, shaped by the eruption of Bárðarbunga volcano is shaping weather patterns in Eastern North America of occasional severe storms alternating with unusual warmth and cooler, stormier weather in the Southeast.
- The fading El Niño is easing problems for Southeast Asia, Australia, Argentina and the Andes nations of South America while making the Brazilian harvest more difficult.
- The cold Northern Atlantic is shaping a stormy spring for Southern Britain and Central Europe. If it continues, it historically summer drought and dryness for Southern Europe from Spain to the Balkans, the Ukraine and Southwestern Russia.
- The largest shaper of Asia's spring is the fading El Niño. It should end before it interferes with India's monsoon but historically is associated with flooding in Southern China.
- Last year's huge California fire season created enough fire and smoke damage to California vineyards that they are having to throw away tons of grapes. Expect California wine prices to rise.

CONTENTS

Shifting into Spring and Summer

Here come the changes – the weakening El Niño, the vanishing Pacific "Blob" and the growing North Atlantic "cold spot" - to give us a very different and stormy spring season page 1

A Quick Southern Hemisphere

Update - The fading El Niño is easing problems for Southeast Asia, Australia, Argentina and the Andes nations of South America while making the Brazilian harvest more difficult. page 5

The Spring Planting Outlook for the Northern Hemisphere

The Atlantic wind patterns should shape a stormy spring with a chance of summer drought for Europe while the Pacific's El Niño may bring flooding problems for Southern China page 6

News N	lotes
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page 8

Shifting into Spring and Summer

Summary – The Pacific and the Atlantic are both shifting – shaping up a stormy spring and a potentially hot and dry summer in North America and a drought-inducing La Niña by next winter.

Winter is fading and with it some of the major climate factors that shaped winter. Unfortunately, as the ocean and cold Arctic air shift, around North America the patterns are changing into what historically creates some very stormy spring weather. While parts of Canada and the US would welcome more rain, the accompanying storm damage will be less welcome.

Let's review what is changing.

The Factors Shaping Spring





1 The strong El Niño is weakening 2 Bardarbunga volcano erupted August 2014 through February 2015 3 The Pacific warm "blob" has vanished

- 4 Warm water off the East Coast of North America 5 The North Atlantic "cold spot"
- 6 Basin wide warming of the Indian Ocean 7 Warm waters off South America
- 8 Record heat in portions of the Arctic

figure 1 © Evelyn Browning Garriss

economic patterns. to their advantage.

Our research shows that climate, We feel that readers, attuned to the changes that are occurring, over the next term, will cause may develop a competitive edge; and, by understanding their dramatic changes in our social and current and future environment, can use the momentum of change

Sea Surface Temperature Anomalies

September 1, 2014

December 31, 2015



figure 2 http://www.thestar.com/news/world/2016/01/01/pacific-blob-breaking-up-but-that-may not-be-good-news.html



Author: David Simeral / Western Regional Climate Center

Northern Canada, away from the thirsty shores of California. At the same time the heat raised western temperatures and increased evaporation. While this type of pattern sometimes develops in summer, the usual dry season for California, having it linger for years has been a weather disaster. Then, surprisingly quickly, a series of late autumn and winter storms ripped through the warm water and cooled it off. Losing the "Blob" is a good thing.

The hot, still water killed marine life. Without cool upwelling waters, nutrients faded and phytoplankton died and fish starved. By 2015 record numbers of sea lions and fur seals were found stranded on California's beaches. At the same time, hot dry weather killed plant life. Expect more rains, fish, healthy plants and fat seals, at least until the next cold La Niña hits the ocean. Speaking of La Niña...



The Fading El Niño and What It Means for California

The El Niño is cooling off. A region of stormier equatorial weather, called a Madden Julian Oscillation, is flowing from the Western Tropical Pacific into the warm El Niño. It is churning the waters and cooling them down. While the key central measuring area of the El Niño is only one tenth of a degree cooler than last month, the outer edges of the event are much cooler. While the central region has the temperatures and characteristics of a strong event, the western side is only moderate in strength and the area off the coast of South America is so cool that it barely qualifies as an El Niño.

This means the El Niño should continue to act like a strong event for most of March. However, it is cooling more rapidly than many scientists expected. The majority of agencies still expect the event to be moderate in spring and end by June, but a closer look at the models seems to indicate a slightly quicker drop than they showed last month. Officially they give 50% odds of a La Niña developing in autumn, but private conversations indicate that unofficially the number is closer to 75%. Of the scientist expecting an La Niña the majority predict the cooler weather event to hit towards August or September.

This is important for North America, since the El Niño typically creates additional rainfall in several areas that have been suffering from years of drought. Officially this El Niño event began on March 1, 2015, when 52%, more than half of the "lower 48" US was dry and almost a third of the states were in drought. The event reduced the drought throughout all but the westernmost states. If El Niño continues into springtime, history suggests it would bring more heavy rains, adding water to California and possibly, once again, eliminating water deficits in Texas.



Changes in Weekly Sea Surface Temperature Anomalies (°C) February 24 minus January 27, 2016 Cooling El Niño area



figure 3 A--B Sea surface temperature changes over the last 4 weeks http://www.cpc.ncep.noaa.gov/products/analysis_monitoring lanina/enso_evolution-status-fcsts-web.pdf

Notice, despite expectations, the El Niño has not brought excess rainfall to drought stricken California. Indeed, as it did in the strong 1972/73 event, it has delivered below average moisture for the southern portion of the state. Even though a continued El Niño can historically be expected to create a "Miracle March" or "Amazing April", the rain will merely provide some respite from the prolonged drought, not an end to the shortage.

The precipitation has built up a good snowpack for the Coastal, Cascade and Western Rocky Mountain slopes. Most of these regions have 125% of normal water content in their snowpack, which promises good stream flows when the snow melts. Similarly, the western reservoirs, with the exception of Nevada (which has only 25% of its normal storage) have between 50 -80% of normal supplies of water.

In California, the situation is more complex. The current situation is not dire - the reservoirs are at 66% capacity and the snow pack is at 92% of what is normal for this date. The statewide snowpack is at 77% of where it should be at the end of a normal winter/spring rainy season. Unfortunately, what is not included in these statistics is the current state of California's underground water. Last year, farmers produced a good crop by investing in wells and drilling. Some estimates are that the state has a six trillion-gallon shortfall of underground water and the current precipitation is not replacing that supply.

The US West is not the only area being affected by the changing dynamics of the El Niño. Canada's Western Provinces are also feeling both the heat and odd precipitation throughout their winter season. Frequent warm temperatures and below average snowfall, left most of the Prairie Provinces with below average moisture. Recent storms are carrying some good rainfall to the Eastern Prairie but Alberta is still facing moisture problems.

The Growing North Atlantic Cold Spot

The Pacific is not the only ocean cooling off. The North Atlantic has had an unusual cool pool of water for months. Historically this is similar to a cool area that developed in the same area after the very explosive

Percent of Average Precipitation:

Last 90 days November 21-February 20, 2016



figures 5A-B Despite a strong El Niño, California has had a near-normal winter rainy season and a dry February. http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

eruption of Iceland's Grímsvötn volcano, so it is logical to guess that this pool may be related to the prolonged 2014/2015 eruption of Bárðarbunga. Unlike the cool area that appeared in 2012, however, this cold region is growing in size. Some recent temperature readings indicate the overall area is not as intensely cold, but it has been growing south and east for months, until it is almost touching the coast of Spain.

The cold has blocked some of the flow of the Gulf Stream current that carries Tropical



Sea Surface Temperature Anomalies December 3, 2015



February 25, 2016



figures 7A-B The North Atlantic cold spot is growing and forcing more warm Gulf Stream water to stall off the East Coast http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/index.html

Atlantic water from Africa to the Gulf of Mexico, along the East Coast and over to Europe. As a result, the waters off the East Coast are unusually hot, as much as 4.5°C (8.1°F) above normal. This caused temperatures in December to be hot throughout central and eastern portions of North America. Now, as occasional cool fronts collide with the warm, wet Gulf and Atlantic air masses, it has generated severe stormy weather, a pattern that should continue into springtime. We have seen this with the deadly tornadoes in the Southern US and severe storms that hammered the Midwest in late February.



EARLY SPRING



Hot	Warm	Cool	Dry	Wet
5°C or	2-4°C or	2-4°C or	75% or	125% or
more higher	more higher	more lower	less of	more of
than normal	than normal	than normal	normal	normal
temps.	temps.	temps.	moisture.	moisture.

 figure 8A-C
 ‡ A moderate Russian volcanic eruption

 will make this region colder.
 *If El Niño conditions

 continue.
 © Evelyn Browning Garriss/Browning Media

So far there is no indication that the cold spot will go away. It is cooling the air mass overhead, strengthening the semipersure which in turn is strengthening the polar jet stream. This in turn reduced the frequency of the Arctic air mass dropping over eastern North America.

History suggests the warmer waters will continue to pour heat inland, creating a much warmer than average springtime and stormier conditions. Remember, the last time we dealt with Icelandic volcano weather patterns was 2012 and that was a very stormy and expensive springtime with a spectacular Midwestern derecho that killed 28 people, left 3.7 million without power and inflicted \$2.9 billion in damages.

Shifting to Spring and Beyond

When all of these patterns are combined, the most probable outcome for spring is that the first half will continue to be shaped by the El Niño pattern of warmth in the north and cooler conditions in the south. The coasts should continue to be wet while the interior has drier conditions interrupted by severe storms.

The weather in late spring should be shaped by whether the El Niño is still in place and whether it is weak or moderate. The stronger it is, the better it will be for If a La Niña develops, it tends to create dry weather in California and the southern tier of states.

Southern Great Plains moisture. If it has become weak, then history suggests the Central Gulf regions should be dry and the entire region in Canada and the US east of the Rockies should be warmer than average with a 60% chance of much hotter than average around the Great Lakes. Early planted crops should grow rapidly. Similarly, the stronger the El Niño remains, the greater the probability of good rainfall in British Columbia and the Pacific Northwest and, 60% of the time, Northern California.

By next issue, the speed of the El Niño's decay and the potential development of a dry La Niña should be clearer. You might want to warn your vegetarian friends. History shows that if a La Niña develops, it tends to create dry weather in California and the southern tier of states. Typically, California, most of the Rio Grande Valley of Texas and Florida have drier conditions, affecting the US winter fruit and vegetable crops and raising prices.



figure 9 © Evelyn Browning Garriss

A Quick Southern Hemisphere Update

Summary The fading El Niño is easing problems for Southeast Asia, Australia, Argentina and the Andes nations of South America while making the Brazilian harvest more difficult.

In April's Browning World Climate bulletin, we will take an in-depth look at the upcoming fall and harvest season for the Southern Hemisphere. Until then here is a basic update for the growing seasons of Southeast Asia, Australia and South America

Southeast Asia: Decadal Percent of Normal Precipitation February 11 - 20, 2016



figure 10 Recent rainfall in Southeast Asia February 11-20, 2016 http://www.pecad.fas.usda.gov/cropexplorer/imageview. aspx?regionid=seasia

SOUTHEAST ASIA - This region, between the Indian and Pacific Oceans, is being shaped by both. Just as the El Niño warms the Central and Eastern Tropical

Pacific, it cools the usually hot waters around Southeast Asia. Fortunately a small pool of warm water (a Madden Julian Oscillation), reinforced by the overall warming in the Indian Ocean has created desperately needed late rainfall for Indonesia and southeastern Asia. This will help Indonesia's third rice crop as well as a last surge for palm oil crops. Due to lower planting during spring, crop yield will be universally lower. Thankfully the late precipitation ensured that the crops that were planted were

> able to survive and therefore the lower yields are significantly less than if Indonesia would have endured and entire crop season of drought.

AUSTRALIA - The Indian Ocean's major oscillation, the Indian Ocean Dipole (IOD), shifted cool water against Australia from late January into early February. More recently, the pattern became more neutral, allowing the water to warm again. Now Australia is feeling the normal drought condition created an El Nino and while the IOD is not countering the dry weather, it is also not intensifying it. This actually will

be good news for the current crops creating a dry and easy harvest. However, this can create concern for late summer brush fires and poor late season grazing. Should it continue, we can expect a slightly larger

SOUTH AMERICA - Early Brazilian crop vields from the start of harvest are down slightly from last year's near record-breaking crop production due to the continual rainfall the major Brazilian agricultural region is receiving. This is making harvesting difficult and transportation slow and dangerous leading to rain damage and spoilage. If and when they lessen, the remainder of the harvest should continue more smoothly. While the crops themselves are plentiful this year in Brazil, in the rest of southern South America, crops were planted late and sparingly due to the El Nino-created drought. Late rainfall has salvaged the crops that were planted and Argentina as well as Peru expect to have better than previously anticipated yields.

Additionally the strong rains are creating havoc in the major cities in Brazil. Last minute construction projects in preparation for the Olympics are either being delayed or are developing under extremely difficult conditions. Civil unrest continues to develop as workers are either not being paid during the down time of construction or are not being paid livable salaries under such dangerous conditions. Even the transit system is seeing more wear and tear due to constant rainfall and frequent flash floods.



Southern South America: Seasonal Percent of **Normal Precipitation** September 1, 2015-February 20, 2016

figure 11 Recent rainfall in Argentina February 11-20, 2016 http://www.pecad.fas.usda.gov/cropexplorer/imageview.aspx?regionid=ssa



figure 12 Recent rainfall in Brazil February 11-20, 2016 http://www.pecad.fas.usda.gov/ cropexplorer/imageview.aspx?regionid=br

%		
	> 200	
	150 - 200	
	125 - 150	
-	100 - 125	
=	75 - 100	
	50 - 75	
	<= 50	
	No Data	

The Spring Planting Outlook for the Northern Hemisphere

Summary – The Atlantic wind patterns should shape a stormy spring with a chance of summer drought for Europe while the Pacific's El Niño may bring flooding problems for Southern China.]

The same climate factors shaping the spring planting season of North America will be affecting the entire Northern Hemisphere. Unlike Canada and the US, which are equally affected by the conditions in both the Atlantic and Pacific, however, the other northern continents are disproportionally affected by only one of the two oceans. While the Pacific El Niño affects tropical weather around the globe, its impact is much greater on Asia than on Europe. European weather is dominated by the conditions in the Atlantic.

EUROPE - The Atlantic is in the long-term warm phase of the Atlantic Multidecadal Oscillation **(AMO)**. This means the Gulf Stream and other Tropical Atlantic currents are flowing north at a very fast rate. However, thanks to the 2014 --2015 eruption of Iceland's Bárðarbunga volcano, the North Atlantic is quite cold and the cold area is growing larger.

This cold has shaped the air pressure overhead, creating a very strong and positive North Atlantic Oscillation wind pattern. As noted in the first article, this has created a very strong jetstream over Eastern North America, the Atlantic Ocean and Western Europe. This jetstream, flowing between the Arctic and subtropical air masses, has pinned most of the Arctic air north, only occasionally allowing a few spectacular storms to escape south.

As a result, Europe has been warmer than average

with the crops in the Balkans breaking dormancy 5 weeks early. Also there have been very dry conditions for large parts of the Mediterranean. Unfortunately, by definition, Mediterranean climate is supposed to get most of its moisture in winter. Like California, if large parts of Southern Europe don't get rain in winter and spring, they never catch up. So far, the Western Mediterranean, from Spain to Northern Italy, have had below normal rainfall.

Normally the impact of the positive NAO is strongest in winter and weakens in springtime. This means the jetstream normally allows more cold fronts to drop south. When these collide with the warmer air rising from the tropics, there are heavy storms. This usually means heavier rains, even damaging storms hitting Western and Central Europe while the Western Mediterranean continues to parch and the Eastern



figure 15 The Positive NAO and its effect on Europe and Western Russia

based on Gouveia, Célia, Trigo, Ricardo M., DaCamara, Carlos C., Libonati, Renata, Pereira, José M. C. "The North Atlantic Oscillation and European vegetation dynamics" International Journal of Climatology Vol. 28, #14



figure 13 http://www.pecad.fas.usda.gov/cropexplorer/imageview. aspx?regionid=eu



figure 14 The Historical Impact of El Niño on Europe's Spring Precipitation

http://iridl.ldeo.columbia.edu/maproom/ENSO/Climate_Impacts/ENSO_PRCP_Prob_TS2p1.html?bbox=bb%3A40%3A-10-%3A170%3A75%3Abb&T=Mar-May&Tercile=dry

Mediterranean, through the Balkans has higher temperatures.

However, many of the conditions that have shaped the winter of 2015/2016 will remain.

- 1. The El Niño will continue to encourage dry conditions throughout Southern Europe from Spain to the Western Balkans. It also correlates with plentiful spring rainfall throughout Great Britain, France, Germany, Poland, Northern and Eastern Europe and Western Russia.
- 2. The Atlantic Multidecadal Oscillation is still pouring heat north. Scientific monitoring indicates the current flow is growing stronger, bringing more heat. Thanks to the growing cold patch, the heat is increasingly compressed against Europe and North Africa and flowing into the Mediterranean.

3. The North Atlantic Oscillation remains positive most of time as the cold North Atlantic waters continue to shape the wind patterns overhead. It is quite probable that the NAO will remain positive throughout spring and may continue into summer. Fortunately, European scientists have been studying the NAO since the pattern was discovered in the 1770s. A February 2008 article in International Journal of Climatology by Célia Gouveia and her Portuguese col-

If the NAO

ern Russia.

leagues, shows the correlation between the NAO and European remains positive, vegetation growth expect summerin the twenty years time problems between 1982 and with heat and drv 2002. The article is weather in Westcopyrighted but the following maps are based on their findings.

Notice, springtime is volatile enough that the correlations are scattered with the most significant correlations being heavier rainfall in Northeastern France, Southern Germany and the Northern Balkans. However, in summertime the correlations are very strong. All of Southern Europe, from Spain and Portugal through Italy, the Balkans to the Ukraine face drier weather while Ireland, Scotland and Scandinavia have more moisture. The dry conditions extend to the Western Mediterranean shores of Africa as well.

All of these seem to indicate that, despite drier winter, spring should start off with more rainfall and decent conditions for greening winter crops and developing spring crops in Great Britain as well as most of Western, Central and Northern Europe. Indeed, in 60% of similar years, wet conditions delayed earlier Northern French and Central European planting. History suggests that dry conditions should continue to hinder conditions in Spain and portions of Southern Italy. The warmer conditions should continue, which will encourage early crop development throughout most of the continent. The situation will have to be monitored because in 60% of similar years, heat and crop problems developed in mid-to-late summer.

RUSSIA- Russia historically has had problems with warmth and drier conditions during years similar to the current conditions, although records of crop

production following Icelandic eruptions are extremely poor. This presents problems since last year's planting of winter wheat fell at least 5% below initial plans. The dry late summer/early autumn conditions hindered development. Although mid-winter saw cold and snow arrive simultaneously, preserving the winter crops from damage, conditions now are quite warm and dry and there is a shortage of protective cover in case of any spring freezes. This drier pattern is very typical of both positive NAO and El Niño spring times. To the west, the Ukraine typically had some of the same warmth, but usually has more spring rainfall.

If the NAO remains positive, expect summertime problems with heat and dry weather in Western Russia.

ASIA - While Europe is mostly shaped by the Atlantic, Asian spring will be shaped by the current strong El Niño, with the Indian Ocean and the Arctic air masses having only a secondary role in determining weather.

The Indian Ocean has a cycle, the Indian Ocean Dipole that, depending on whether it is positive or negative, can enhance or reduce the impact of the El Niño. Since the IOD is neutral, with almost the entire ocean warmer than normal, it will do little to alter normal El Niño patterns.

Further north, with the North Atlantic cold and the strong Arctic jetstream over the Atlantic, most Arctic cold has been escaping south into Asia, creating some record-breaking winter cold in Northern China. February was warmer, but history



figure 16 Spring outlook for Europe and Western Russia © Evelyn Browning Garriss



figure 16 Asia During El Niño

ttp://iridl.ldeo.columbia.edu/maproom/ENSO/Climate_Impacts/ ENSO_PRCP_Prob_TS2p1.html?bbox=bb%3A40%3A-10-%3A170%3A75%3Abb&T=Mar-May&Tercile=dry

suggests a return of cold weather during early spring if the NAO continues, as most scientists expect, it to remain positive through springtime.

Overall, expect most of Asia, particularly Southeast and East Asia, to continue to show El Niño weather patterns for most of spring. The big issue will be how heavy the normally severe spring El Niño rainstorms will be. In the large 1997/1998 event, the El Niño was over by April and Southern China was plagued by severe flooding the following June. Similarly, millions in Central and Southern China were hit by terrible floods following the June floods after the 1982/1983 event. During the strong event of 1972/1973, however, there appears to have been no major flooding. Officials are aware that floods are a distinct possibility and the spring "Plum Rains" will be monitored carefully. There are more dams in place since the last large event, so even if the monsoons are heavy, the rivers should be under better control. Local areas might experience severe flash flooding but the nationwide disaster of 1998 should be prevented. this year.

Watch the tropics. If, as many expect, La Niña conditions develop by late summer or early fall, it will be good news for most of Asia. Northern China might have difficulties with a wet harvest season, but it would create ideal conditions for much of India, Southeast Asia and Southern China.

While El Niño remains a remote ocean event, for Asia it shapes the price and availability of food for hundreds of millions of people.

Just when polar bears were starting to relax – the Arctic ice has reached a record low. While most headlines focus on the ice melting in summer, the other part of the cycle is that the sea ice grows back in winter. This January the Arctic Oscillation, the jetstream circling the North Pole, suddenly weakened. As the cold air poured south, bringing the horrendous blizzard to Eastern North America, the Arctic region further north warmed up by 6° C (13°F). Temperatures rose above freezing. The AO winds strengthened back by the end of January, but the weeks without freezing have set the amount of Arctic ice at an all-time low for winter.

> March is typically the end of Southeast Asia's rainy season and the beginning of Indonesia's annual fire season. Last year the El Niño drought allowed the fires to get out of control and the flames did an estimated \$15.72 billion in damage, amounting to 1.0% of the nation's gross GDP. The haze from the smoke spreads to neighboring nations, creating widespread smog and health problems. The fires typically are started by slash and burn agriculture and spread to the underground peat, where it smokes and smolders for months. The governor of the northern island of Sumatra has promised the fires will be reduced but with the El Niño baking the region this winter and extending through spring, the region can expect another severe start to the spring wildfire season.

One of the most difficult areas to follow the impact of El Niño is in Africa. Weather satellites show that the event is causing severe drought in Eastern and Southern Africa. However, the ground reports are more haphazard. The United Nations claims a million children are facing severe malnutrition. In Ethiopia reports between 10 to 18 million of its citizens are facing food shortages. Some reports are estimating the numbers of starving and malnourished are as high as 49 million.

The wetter-than-average winter in California may be providing some respite for the state's water supplies but not necessarily for its farmers. Many farmers are still getting a zero federal water allocation. At the same time, the federal projects plan to divert 162 billions of gallons of water to the Pacific Ocean to preserve the Sacramento Delta smelt, a three-inch fish protected by the federal Endangered Species Act. So far the government has spent 1.4 trillion gallons of water since 2008 to protect the fish and its habitat and a recent House subcommittee has received reports that the species remains as vulnerable as ever. At the same time, the report also noted that these methods have not be able to increase the Sacramento River's dwindling salmon run either.

Last year's dry conditions created a record-breaking US fire season and you will feel the impact every time you order a nice glass of wine. Last year's wildfire season set a record with more than 10 million acres burned (average 6.6 million). That's more land than Maryland, the District and Delaware combined. Much of the damage was in remote portions of Alaska, but California was hit hard. The Golden State lost tens of thousands of acres and hundreds of homes. Fires surged close to the state's wine country and in early February, it was announced that between fire and smoke damage, California vineyards are having to throw away tons of grapes. Experts predict the price of California wines will go up. Unfortunately, with the increased brush growth from the wetter winter followed by potential drought-inducing La Niña conditions, this year may also be fiery.

A recently released study indicates the recent late December and January floods in the Mississippi were "a manmade calamity, not climate change" At the end of December, a huge storm named "Goliath" dumped 9-10 inches of rain in a belt across the central United States, centered just southwest of St. Louis. Soon afterwards, water levels on the Mississippi at St. Louis were the third-highest ever recorded and record floods were recorded in both Missouri and parts of Illinois. A February report by Dr. Robert Criss, PhD, of Washington University and Mingming Luo of the China University in Wuhan, China, showed that the flooding was due to recent construction, not just rainfall. Three housing developments, a three-mile levee and a landfill had been built since the last record-rainfall, during the 1982/1983 El Niño and it narrowed the flood plain 65%. The flood waters rose along each of these constructions and the river flow became more unpredictable. The St. Louis levees that protected the region during the huge floods of 1993 were unable to protect the region now from a smaller flood due to the chaotic new river patterns. As a result, 20 people died, 7,000 buildings were damaged and the area suffered several hundred million dollars of losses. The protections built decades ago along the Mississippi and other rivers are no longer adequate for today's streams with unconnected and uncoordinated years of new construction - especially after the housing boom of the early 2000s.

Wanted – a weather scientist with strong legs to fight urban heat islands. One of the newest additions to meteorology is a sturdy cargo bike that is a traveling weather station. Developed by University at Buffalo architect Nicholas Rajkovich, it is designed to study city microclimates. While a few stations, usually in a city center or airport, give the overall urban temperature, the conditions in different neighborhood environments are poorly understood. Rajkovich designed the traveling weather station to explore the streets of Cleveland and surrounding suburbs during the 2012 heatwave. It helped to explain how things like tree cover and landscaping contributed to the temperature variations of the city's different neighborhoods. The data, published in the January International Journal of Environmental Research and Public Health, is now being used to help Cleveland develop its urban landscaping to reduce local hot spots. Next - Rajkovich is tentatively planning to pedal through beautiful Buffalo New York.

published by:



The Browning World Climate Bulletin is

published monthly at an annual subscription rate of \$295. Subscriptions should be directed content "as is" without representations or warranties of any kind, either to: Alex@BrowningNewsletter.com 1-704-471-0176

Browning World Climate Bulletin February 2016 page 8



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